

REMARKS

By the present amendment in the accompanying RCE, the independent and dependent claims have been amended to clarify features thereof.

Applicants note that the present invention relates to a vacuum processing apparatus comprising a vacuum transfer unit connected to the back side of a transfer box under an atmospheric condition, which is able to hold wafer cassettes installed at a front side thereof, and processing chambers connected detachably at a back or lateral side of the vacuum transfer unit, and its characteristics lie in a constitution in which the connector portions of paths supplying utilities from under the floor to the processing chambers are disposed linearly at the back side of the transfer box and the utility paths can supply gas from a building where this vacuum processing apparatus is disposed to the processing chambers or can discharge the supplied gas. In a vacuum processing apparatus, like the present invention, which causes substrate wafers to be processed under reduced pressure in the processing chambers by means of supplied, processing gas and a plasma and wafers to be transferred to (from) this vacuum processing apparatus under a general atmospheric condition, an atmospheric transfer container which wafer housing cassettes are mounted on are disposed as a means of clearly defining a vacuum side and an atmospheric side in the apparatus and giving and receiving the wafers transferred under an atmospheric condition. In the present invention and in Bright et al, in particular, an atmospheric transfer unit for transferring wafers housed in cassettes under an atmospheric condition is disposed and used at the front side of the apparatus.

In this structure, the wafers transferred under an atmospheric condition are transferred to and processed in the vacuum processing chambers at the back side of

the transfer unit and subsequently they are brought back again to the cassettes by this atmospheric transfer unit. This kind of atmospheric transfer unit, which uses a box in which wafer housing cassettes are disposed at its front side and a robot for exchanging wafers among the cassettes and transferring them is disposed is known, as set forth in the present invention and in Bright et al.

When this kind of vacuum processing apparatus is set up, in general, a plurality of them are aligned in a building where they are set up. Further, a path for transferring the cassettes that house wafers to be processed or wafers that were processed by each of the aligned apparatuses is formed at the front side of the transfer box disposed at the front side of the vacuum processing apparatus. Namely, a shared transfer path for transferring wafers and cassettes to a plurality of apparatuses is disposed at the front side of each apparatus, and the vacuum processing apparatus, like the present invention, has a constitution in which the front surface of the front side of the apparatus (transfer box) faces this transfer path.

On the other hand, at the back side of the box of this kind of vacuum processing apparatus, together with a plurality of processing chambers which process wafers under a vacuum condition and a transfer container for vacuum transfer for transferring in and out the wafers under a vacuum condition, a connector portion for connecting the front side of the transfer container for vacuum transfer and the back side of the box for atmospheric transfer, is disposed. More specifically, the present invention can be considered to have a constitution in which the wafers in the cassettes transferred through the path to the transfer box are brought back again to the front side of the apparatus after being transferred to the back side of the apparatus by way of the transfer box and processed.

In a case, where this kind of vacuum processing apparatuses is to be arranged in a building, it becomes necessary to provide paths for supplying gas, water, air and the like (utilities), and such paths as pipes for discharging waste therefrom, and have them function in processing chambers that are vacuum portions dealing with wafers under a vacuum condition and a vacuum transfer unit that is connected to the processing chambers and transfer wafers under a vacuum condition, unlike the box dealing with wafers under an atmospheric condition. The supply and discharge of these utilities are made between buildings in which the apparatuses are set up and it is necessary to connect these paths provided in the buildings in advance. These utilities are generally supplied from the supply source of utilities disposed on a floor different from the floor where the vacuum processing apparatus is set up in a building, for instance, down below (under the floor), to above the floor by means of pipe paths and the like.

If pipes and the like, which form the pipe paths from these buildings, are to be directly detached or exchanged at each position of the vacuum processing chamber and the vacuum transfer unit, then the pipes of the buildings do not reach these connection sites in some cases, depending on the structure of the containers and processing chambers. Particularly, in such structures, as in the present invention and in Bright et al., where processing chambers are detachably disposed from the transfer unit or the apparatus itself, the connection sites between the abovementioned pipes and the like and the containers may vary according to the structure and the shape of newly attached processing chambers. If the structure and the shape of newly attached processing chambers greatly differ, the connection sites of the abovementioned paths for utilities significantly change.

For the adjustment of this, the length of pipe paths forming the abovementioned paths under the floor or above the floor is required to be changed, and thus it becomes necessary to acquire and connect new pipes that form the pipe paths and have a necessary length and to change the sites of the pipes under the floor. Such work imposes a heavy burden on workers setting up the apparatuses and users purchasing and using them. Moreover, the above-mentioned connection causes other problems. These paths made of pipes and the like are disposed around the vacuum processing chambers and these connection sites together with the pipes and the like deprive workers of sufficient work space and reduce work efficiency when work is performed on the vacuum processing chambers for users. They increase a substantial setup area for a vacuum processing apparatus and decrease the number of the apparatuses that can be installed in a building where the apparatuses are set up and impair efficiency in the comprehensive processing for users.

The present invention, as now recited in the claims, is provided with a structure so as to solve the foregoing problems, and this structure contributes toward achieving the working effect described in the specification of this application. More particularly, the present invention facilitates work for connecting a plurality of supply/discharge paths among buildings to improve work efficiency for their setup and limits a reduction in work space at the time of such work as the maintenance of the apparatuses including vacuum processing chambers and reduces setup space for the apparatuses.

In accordance with the present invention, since the above-mentioned connector portions on the utility paths are found at the back side of the transfer box, which makes it difficult to cause the outer structure and shape to be changed, and

are linearly disposed under the connector portions of the transfer unit disposed at the back side of the transfer unit and the transfer box and along the back surface of the transfer box, changes in the utility paths and connection sites are limited, as was explained above, even when the exchange of parts at the time of maintenance and the exchange of the chambers and the unit themselves changes the shape and the structure of the processing chambers and the processing unit. Consequently, the setup work and the maintenance work of the apparatuses themselves become easier and efficiency is improved and the specific working effect can be achieved.

Turning to Bright et al, such patent discloses a processing apparatus provided with a transfer box (100) for transferring wafers under an atmospheric condition at a front side, a vacuum transfer chamber connected to the transfer box (100) at the back side of the transfer box (100) and a plurality of processing chambers (14) detachably disposed around the vacuum transfer chamber, and it further discloses an arrangement in which paths such as pipes for supplying utilities including gas to the processing chambers (14) are connected to each of the processing chambers from the utility connector portions connected to the platform at the back side of and under the vacuum transfer chamber.

On the other hand, Rubin et al. discloses a processing apparatus that connects and combines a plurality of modulators, which comprise connectors (104, 158) provided with processing chambers on the chassis and connected to a service pipe (172) below, and are detachably constituted and perform specific processing on wafers. Rubin et al. specifically discloses a processing apparatus made up of six modulators coupled in a U shape on the service pipe (172) disposed in a U shape in Figure 5 and a constitution in which each modular is connected to the service pipe (172) below and receives the supply of gas and the like. In Rubin et al., the service

pipe (172) corresponding to the utility paths of the present invention is disposed over the entirety of the surface under the modulars corresponding to the processing chambers and the vacuum transfer unit of the present invention.

Although the Examiner apparently contends that by a result of applying the features of Rubin et al to Bright et al, provided with each of the modules, that is, similarly detachable processing chambers, transfer unit and connector portions (load lock), the claimed features in which the service pipe is disposed under each of the modules including load lock modules, is obtained, this position is erroneous. None of the cited art discloses or suggests the feature of the present invention, that is, “a plurality of connector portions of utility paths which connect with paths arranged in another floor of different from a floor of the building in which the vacuum processing apparatus is installed so that the at least one vacuum processing chamber is disposed above the floor, the plurality of connector portions being disposed substantially linearly under the connecting portion of the vacuum transfer unit and the back side surface portion of the transfer box and along the back side surface.” Therefore, even if Bright et al and Rubin et al are combined, applicants submit that it is impossible to provide the above-mentioned feature of the present invention and the advantages obtained.

While the apparatus disclosed in Rubin et al. comprises processing chambers disposed in the chassis above and covering the linear or U shaped service pipe, and the connectors, which are rectangular board members having penetration holes through which pipe paths for such utilities as gas from the service pipe penetrate. However, Rubin et al does not disclose the feature of the present invention, that is, that the transfer box transferring wafers housed in cassettes under an atmospheric condition is disposed at the front side of the transfer unit for transferring the wafers

under a vacuum condition. Although the Examiner appears to interpret the structure of Rubin et al as having connectors are disposed at the "rear (surface)" of the box since the penetration holes of the connectors connected to the service pipe (112) are disposed under the processing module of each modular and that the "rear (surface)" means under (the bottom surface of) the chambers or box. In view of this interpretation, though in Rubin et al the utility connector portions can be said to be disposed "at the back side of" the processing module of each modular, on the other hand the transfer unit and the processing chambers connected to the transfer unit cannot be said to be disposed at the "back side," as disclosed above. Applicants submit that it is doubtful whether Rubin et al discloses the inside transfer box for transferring wafers under an atmospheric condition, which is a feature of the present invention. Since a module expected to have a cassette housing a wafer is disposed in the modulars under both ends of Figure 7 of Rubin et al, no transfer unit for transferring wafers under a vacuum condition or no processing chambers coupled to the transfer unit are disclosed at the back of these modulars (transfer box) even though this modular is regarded as the transfer box. Since the penetration holes of the coupling boards (114, 158) of Rubin et al are disposed over the entirety of the coupling boards (114, 158), it can be concluded that the penetration holes of the coupling boards (114, 158), which are the connector portions of a certain modular are disposed at the back side, which is a "side facing a downstream chamber to which wafers are transferred, of an adjacent modular, and in this respect, the Examiner apparently contends that where Rubin et al is applied to Bright et al, the penetration holes of the coupling boards, which are connector portions, are disposed under the load lock module (16) (connector portion with the transfer box) of Bright et al. However, when the invention of Rubin et al is properly considered, the modular

of the present cited invention comprises a chassis, (102), which has a square cross section and is detachably mounted on a coupling unit (104) as if it covered the top surface of the coupling unit (104), and processing modules (176) mounted on this chassis (102). The chassis is disposed above a constitution on the floor, which comprises the service pipe (connector pipe) (172) coupled to the work function source, such as gas and power, arranged at another site and the coupling unit (104) connected and coupled to the service pipe (172) disposed above and covering the service pipe (172). Since this modular that is detachably mounted above can be exchanged in response to necessary processing or a plurality of modulators can be coupled, this Rubin et al makes it possible to add, delete and change its processing steps and specification easily. More specifically, in the cited art, the modular is detachably mounted on this coupling unit (104) and above the constitution in which the coupling unit (104) that can couple this modular and the service pipe (172) above the floor is provided on the service pipe (172). In this respect, the invention by Rubin et al can be said to regard it as a constituent feature that the service pipe (172) is disposed at certain positions or sites above the floor and has a certain dimension, such as lengths, and that each modular has the coupling unit (104). This feature is apparent from the Example of the cited art, wherein a chassis coupling board (114) coupled to the coupling unit (104) and disposed inside the chassis (102) of the modular above the coupling unit (104) is disposed adjacent to the coupling unit by a lever unit (112) and its shape is made to be approximately identical with the shape of the coupling board (158) of the lower coupling unit (104) and that it is described that each processing apparatus can easily be moved on the coupling unit (104) front other places. Therefore, if the application of this Rubin et al and Bright et al is taken into consideration, it can be concluded that not only the coupling board (114)

corresponding to the connector portion of a utility path, but also the combination of the coupling unit (104) including the lower coupling board (158) and the service pipe (172) coupled to these are similarly disposed in Bright et al and that under each processing module and each of the transferring module and the load lock module, the coupling unit (104) is disposed and that the service pipe (172) is disposed on the floor so as to couple each coupling unit (104). This structural arrangement of Rubin et al, of course, is deemed not to be appropriate for solving the problem and achieving the objective of the present invention, while improves efficiency in the work for setting up utility paths at the time of setup and maintenance of the apparatus and differs from the structure of the present invention and further not to be appropriate for the objective of Bright et al, which provides for quick and easy disassembly, reconstruction and reassembly. From this viewpoint, applicants submit that it is apparent that those skilled in the art would not consider of applying the features of Rubin et al to Bright et al, and applicants further submit that the recited features of the independent and dependent claims are not obtained. Likewise, Bernard et al and Maydan et al do not overcome the aforementioned deficiencies of Rubin et al and Bright et al.

In view of the above amendments and remarks, applicants submit that all claims present in this application should now be in condition for allowance and issuance of an action of favorable nature is courteously solicited.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli,

Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 648.43120CC2),
and please credit any excess fees to such deposit account.

Respectfully submitted,

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